

## **MISSION REPORT**

### **Black Leaf Streak Disease (BLSD)**

#### **Expertise carried out in St Vincent and St Lucia banana plantations.**

Report of the sanitary situation and measures taken by local authorities to control the disease  
Recommendations

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The mission took place on June 22<sup>nd</sup> -23<sup>rd</sup> 2010 with Liliane Fabry (IT<sup>2</sup>)

*NB: as the length of the plantation visits was relatively short, this report may not be representative of the sanitary conditions of the whole banana plantations in St Vincent and St Lucia. However the mission allowed us to make the following observations:*

### **St Vincent**

The visit was conducted by Mr. Van Loo (Ministry of Agriculture- in charge of BLS control), on plantations in the Centre and in the North of the island (main production zone).

- **Observations :**

'Abandoned' fields, or fields where the grower didn't return for a certain period of time, are numerous and thus very much infested. Also, commercial plantations for export or for local market (Cavendish or plantains) are mainly in a very critical sanitary situation; the level of inoculum is very high in these plantations. This is characterized by necrotic lesions (last stages of the disease) on leaves of rank 4-5 on growing banana plants. A lot of plants with a bunch have no leaf alive any more. Some bunches actually ripen in the field before harvest.

The growers don't deleaf, or very little. Deleafing is done by a few isolated growers but thus it is not very efficient. The re-infestation of the banana plants is quick indeed, given that they are surrounded by plantations that are much infested.

The banana industry is apparently not organised very well, and on top of that there is a lack of technical skills and knowledge on BLSD.

Periodically, systemic or contact fungicides, mixed with oil, are sprayed with an aircraft (systemic products are triazoles - Tilt/propiconazole or Tilt generic like Bumper and contact products are morpholines-Volley); because of the topography of banana fields (valleys-low lands and steep hills) the pilots are spraying at 30 or 40 m above the ground (cf. frequent and abundant coconut trees in these areas).

The efficacy of the fungicide application obviously depends on the quality of the covering. This quality needs to be optimum. The optimum droplet size and number of droplets/cm<sup>2</sup> of leaf surface can be determined during aerial treatments for fungicides applied with water or fungicides applied with oil. The fungicide applications are not or very little efficient in the current conditions of the aerial treatment.

The small range of products that the growers can use, the small amount of available products and the specificity of these fungicides will certainly worsen a situation that is already critical, because it will rapidly select *Mycosphaerella fijiensis* strains, resistant to the systemic fungicides used. Indeed, no deleafing is done before the treatments, and applying systemic products on necrotic lesions that carry sex organs of the fungus will consequently increase the selection pressure on the pathogenic agent.

Fungicide resistance develops on high levels of inoculum and thus on badly controlled necrotic lesions on the plantations.

Apparently, no observation is done on banana plants, at least to verify the effectiveness of applied fungicides (e.g. YLS evaluation).

The sanitary situation will probably get even worse in the next weeks or months, due to the climatic conditions that are very favourable to the disease (rainy season) and to the high parasitic pressure.

Periods that are more favourable to the disease and to the dispersion of inoculum ascospores are generally periods of heavy and frequent rain, interrupted by rainy periods; each time the necrotic lesions are re-hydrated (stages 5 and 6), ascospores can be liberated once the tissue has dried out.

Besides, stream water can carry away conidia (spores of asexual multiplication of the fungus) that are mainly present on the stages 3 and 4 symptoms (not blocked by curative fungicide application). The conidia are transported to the lower banana leaves and then lead to the re-infestation of the mother plant and of its suckers too.

Growers met during the visit are demanding assistance and are angry with the authorities that don't respond to them.

- Recommendations :

In the current conditions, it is recommended to stop the aerial treatments on production zones where the sanitary situation is very critical - these treatments worsen the situation rather than improving it.

It is urgent to train growers and/or extension staff to recognize the BLSD different stages (young stages 1 and 2; lesions of stage 3 and 4, where asexual spores are produced; lesions of pre-necrotic stage 5 and necrotic stage 6, where sexual spores are produced) and to deleaf correctly. Deleafing is a mechanical technique that will restore a good sanitary situation in a durable way.

The top priority of these recommendations is to decrease the parasitic pressure significantly. Thereafter, it will be possible (depending on logistical means) to think of implementing integrated chemical methods to control BLSD efficiently.

## **St Lucia**

The visit was conducted by an extension officer of the BPMU.

After the field visit, a meeting was organised at the Ministry of Agriculture with Mr Compton and Mr Alexander.

- Observations: the situation is more mitigated than in St Vincent. Apparently BLSD has not totally replaced Yellow Sigatoka (YS) yet, which can be found alone on certain plantations or mixed with BLSD on others. BLSD can be found alone too.

The situation is very heterogeneous in the production zones visited.

Some fields are on a good sanitary situation. Deleafing is done on these plantations and fungicide treatments with triazoles or morpholines are made with mist blowers. The frequency of these treatments currently allows controlling the disease: the infestation is low or null on new emitted leaves which may indicate that the *M.fijiensis* inoculum has not spread evenly on the different production zones yet. Cf. field topography –isolated valleys and coastal zones where parasitic pressure is and will remain low due to the climatic conditions.

The situation could get worse in production zones where climatic conditions are very favourable to Sigatoka (high hygrometry, temperatures non limiting for the disease...); this deterioration should be even quicker in fields and areas where the parasitic pressure is already very high. In certain zones, a lot of ‘abandoned’ fields or fields in production are currently much infested.

- Recommendations :

Like in St Vincent, it is recommended to stop the aerial treatments on production zones where the sanitary situation is very critical. The treatments can nevertheless be continued on other areas where the disease (black or yellow) is correctly controlled.

Priority has to be given to less ‘fragile’ active ingredients (cf. risk of resistant strain apparition) rather than systemic fungicides (triazoles, strobilurines...); treatments with straight oil or mixed with contact products (morpholines...) could be chosen.

Very severe deleafing has to be generalised rapidly on all the fields; methods are indicated in this report. The frequency of the cycles will have to be determined depending on the evolution of the sanitary situation.

Like in St Vincent, training of growers and/or extension officers (BPMU /growers’ association) to deleafing and cultivation methods of BLSD control should be given very soon, in order to have coordinated actions on all the plantations.

If fungicide treatments are kept on production zones where the banana sanitary situation is very bad (persisting leaf necroses), the major risk is to obtain *M.fijiensis* strains less sensible to the systemic fungicides used, or even resistant to them.

These strains may already be present in St Lucia (and also in St Vincent), considering they come from Latin America. Lab analyses could define the status of these strains that may

contaminate banana plantations in Martinique in a near future. Cirad could make these analyses in Montpellier during the second semester of 2010.

If strains resistant to the fungicides used are to be found, the chemical control strategy will have to be modified consequently; but this could be difficult in the current situation of St Lucia and St Vincent.

Risks of natural contamination of the banana plantations in Martinique are increasing significantly because at this time of the year, South winds are quite frequent (hurricane season).

On production zones where treatments will/need to be interrupted (cf. destruction of abandoned fields and deleafing on the plantations), the treatments may be resumed later on when the sanitary situation is good and if logistical means allow growers to implement an efficient chemical control (cf. number of mist blowers, quantity of available fungicides and range of products that can be used alternately...).

'Pilot' farms or fields could be identified in St Lucia and St Vincent. Time for the industry to be coordinated (cf. 'coordinating unit' to be put in place), these could be used to demonstrate efficient strategy control of BLSD (deleafing and integrated chemical control /observations of biological state of the disease- evolution stage, YLS.../general field and plant management). These pilot fields could be associated with the trials of innovative crop systems/nematode control/cover crops... and the evaluation of new hybrid varieties of Cirad that offer interesting agronomic capacities and partial resistance to BLSD (cf. Interreg project).

### **Summary of the recommendations:**

*-Priority N°1:* stop the chemical treatments on production zones where the sanitary situation is very bad

*-Priority N°2:* destroy the abandoned fields

*-Priority N°3:* « clean up » the plantations with severe deleafing –for *all* the plantations

*-Priority N°4:* build up a common unit to coordinate BLSD control

Training to consider: identify symptoms and stages of the disease + deleafing technique + cultivation control methods

*-Priority N°5:* implement integrated chemical control methods.

Training to consider: BLSD field observation methods / biological monitoring/ field evaluation of the fungicide efficiency.

## **APPENDIX**

- **Deleafing method (mechanical method).**

Deleafing is a 'mechanical' control means that decreases the quantity of inoculum on the plantation very significantly. Deleafing goes along with chemical control; it allows the chemical control strategy to be more efficient but can be a control method on its own -in certain conditions, it is the main means of eradicating the disease.

In the current situation, leaf surgery or sporadic deleafing won't work -removal of necrosis patches or isolated necroses only is not sufficient.

It is necessary to identify well the different disease symptoms and stages in order to do a good deleafing.

Stages 3 and 4 have to be taken into account (they present fungus asexual organs) because they can lead to new stage 5-6 necroses in a few days; these lesions will produce ascospores – in the best case, the next deleafing may not be done before the following week.

Severe deleafing allows the fields to be in a better state durably and is thus strongly recommended.

- **Deleafing has to be done in the following way :**

Remove 50% of the leaf surface if stages 3 or 4 (evolving towards necrosis) and/or 5- 6 (necroses with sexual organs/perithecia) are present on the leaf.

Remove all the leaf if these same symptoms are present on the entire leaf surface.

If possible, return the removed leaves with stage 5-6 necroses upside down (top of the leaf in contact with the ground), because the number of perithecia is lower on the downward facing side of the leaves. It is even recommended, particularly in newly planted fields, to remove leaves with necroses out of the field, or to pile them at the end of the row. In this case, only the last leaf on the top of the pile will be able to emit ascospores.

In the current conditions, on certain fields in production, a very severe deleafing could mean removing most of the banana leaves; yet this method will have to be followed because it is the only solution to restore quickly and durably a good sanitary situation in the plantations.

Besides, studies have shown a direct relationship between leaf necroses and banana green life: green life is shortened by the presence of necrotic patches.

A necrotic leaf, if not removed but left hung on a banana mat, can produce ascospores during 4 to 5 months; sporulation lasts for only 1-2 months if the leaf is cut down and is null if the leaf is buried.

A good deleafing can reduce spores production by more than 80% (and by more than 95% if urea is sprayed on top of the removed leaves).

- **Other cultivation methods of control:**

Deleafing can be complemented with other cultivation measures regarding field and plant management: plant nutrition and field operations, search for optimum density to allow a better circulation of fungicide mists, and humidity conditions less favourable to the disease.